BRIDGING SCIENCE AND VALUES: A UNIFYING VIEW OF MIND AND BRAIN

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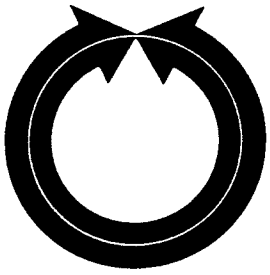

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Reprinted from:

The Centrality of Science and Absolute Values

Proceedings of the
Fourth International Conference on the Unity of the Sciences
New York, 1975

ABSTRACT

The traditional dichotomy that has separated science and ethical judgment and has set corresponding limitations to the domain and role of science, is challenged in the context of recent developments in the concept of consciousness and mind-brain relations. A modified theory of mind has emerged during the past decade that provides a conceptual explanatory model for psycho-physical interaction in terms acceptable to neuroscience. The current revised approach brings together aspects of both materialist and mentalist doctrine in a compromise combination that carries widespread implications for the philosophy of science and its role in the realm of moral judgment. Subjective values in the current interpretation transcend their constituent neural events in brain function to become causal determinants per se with objective consequences. The pervasive strategic control power of human values as universal determinants in all social decision-making is emphasized along with the potential value of a more active involvement on the part of science. Science, on the above terms, divorced from materialist-behaviorist philosophy, reductionist fallacies, and the effects of misapplication and social overgrowth, successfully fends the great bulk of antiscience criticism. Its developing worldview offers the most valid alternative as a source and authority for shaping new ethics and meaning.

Introduction

General acceptance of the inadequacy of science in the realm of ethics and moral judgment is reflected in the old adage that "Science deals with facts, not with values," and its corollary that "Value judgments lie outside the realm of science." In other versions it is stated that science may tell us *how* but not *why* or that science may show us how to achieve defined goals, but not which are the right goals to aim for. A further pronouncement holds that science can tell us what *is* but not what *ought* to be: science *de*scribes but cannot *pre*scribe.

Although this time-honored dichotomy between science and value judgment has not gone unchallenged [1, 2, 3], the great majority in science, philosophy and related fields continue today to accept the tradition that science as a discipline must by its very nature operate in the realm of objective fact and that science, either as a method or as a body of knowledge, can neither formulate value standards nor resolve issues in the domain of subjective value. When it comes to value conflicts and ethical validation, we are told that we must seek our answers elsewhere—in the humanities, in ethics and philosophy, and particularly in religion, long held to be the prime custodian of human value systems. In what follows, my aim, in large part, is to try to show that this traditional separation of science and values and the related limitations it has implied for science as a discipline are no longer valid in the context of current mind-brain theory.

The issues at stake, even by the most hard-nosed, pragmatic standards, are neither trivial nor ivory tower. Human values, in the framework to be spelled out below, become a practical concern of concrete consequence. In addition to their commonly recognized significance from a personal, religious, or philosophic standpoint, human values can also be viewed objectively in scientific terms as universal determinants in all human decision making. All decisions boil down to a

choice among alternatives of what is most valued—for whatever reason; and are determined by the particular value system that prevails at the time. Viewed objectively, human value priorities stand out as the most strategically powerful causal influence now shaping events on the surface of the globe. More than any other causal system with which science now concerns itself, it is variables in the human value factor that will determine the future.

I have rated human values as a social problem above the more concrete crisis conditions like poverty, population, energy or pollution, on the following grounds[3]: First, all these crisis conditions are man-made and very largely products of human values. Further, they are not correctable on any long-term basis without first changing the underlying human values involved. And finally, the more strategic way to remedy these conditions is to go after the social value priorities directly in advance, rather than waiting for these value changes to be forced by changing environmental conditions. Otherwise we are doomed from here on to live always on the margins of intolerability, because it is not until things get rather intolerable that the voting majority gets around to changing its established values.

The importance of value issues is apparent also in other perspectives. From the standpoint of brain function, it is clear that a person's or a society's values directly and constantly shape its actions and decisions. Any given brain will respond differently to the same input, and will tend to process the same information in quite diverse ways depending on its particular system of value priorities. In short, what an individual or a society values determines very largely what it does. As human numbers increase, and science and technology advance, the regulative control role of the human value factor (that directly determines how all this growing human impact will be applied and directed) will become correspondingly more powerful.

In a different vein we are informed that the prevailing social neurosis of our times is a growing sense of valuelessness, apathy, a sense of hopelessness and loss of purpose and ultimate meaning. One is reminded of the generalized disintegration of long established values and belief systems and the grasping in all directions for new answers, new life styles, and the reviving in radical form of some of the old answers. From still other directions come warnings that we need a whole new system of social value guidelines if civilized man is to survive, "new ethics for survival" as Hardin[4] puts it, that would act to preserve man's world instead of destroying it.

Accepting the enormous control power of human values and the critical key role their shaping will play in determining the future, it follows that if science is inherently inadequate to deal with value problems, we are indeed confronted with a profound shortcoming in science and all it stands for. On these terms perhaps it is for the best that government should be tightening the screws on the funding of science, especially pure science; and that public confidence in science generally should be in question, while the forces of antiscience gain new ground fostered by the eloquent and often cogent writings of critics like Roszak[5] and Mishan[6]. Certainly the future of science will be very different depending on whether science is, or is not, recognized in the public mind to have competence in the realm of values. Of greater importance, the future of civilized society and of the ecosystem generally will also be very different, depending on the extent to which future social values are shaped from the world view of science or from various alternatives.

Grounds for Reappraisal

While the epistemological separation of science and values has seemed logically justified in the past, especially with respect to physical science, and still applies in practice to many aspects of scientific methodology, new grounds can be seen today to directly question the main philosophic validity of the science-vs.-values dichotomy. Recent developments, especially in the behavioral sciences, reopen central questions and greatly strengthen arguments for a revised, almost diametrically opposed philosophy in which modern science is advanced as man's prime hope in the quest for new values and a sense of meaning. Problems of values, ethics and morality (questions, i.e., of what is *good, right* and *true* and of what *ought* to be) become, on these revised terms, something to which science can, in the most profound sense, contribute fundamentally and in which science should be actively and responsibly involved.

Although proposals along similar lines since Francis Bacon have failed to gain any wide acceptance and have been largely written off under the label "scientism" by detractors, conceptual developments during the last decade in the area of mind-brain relations introduce an interpretation of conscious mind and a related philosophical framework that substantially alter the picture. The scope of science in respect to mental activity and its qualifications for dealing with subjective

experience are directly affected. A modified concept of the relation of subjective experience to brain mechanisms and to external reality has emerged, that involves a direct contradiction of the central founding thesis of Behaviorism in this country and of the materialistic philosophy in Russia and elsewhere[7-10]. Important departures from long-established determinist and materialist doctrine follow with extensive implications for the philosophy of science and derivation of values.

Current mind-brain theory no longer dispenses with conscious mind as just an "inner aspect" of brain activity, or as some passive "epiphenomenal", metaphysical, or other impotent by-product, as has long been the custom; nor does it reject consciousness as merely an artifact of semantics or as being identical to the neural events. Consciousness, in these revised terms, becomes an integral, dynamic property of the brain process itself and a central constituent of brain action. Subjective experience is viewed in operational terms[11] as a causal determinant in brain function and acquires emergent control influence in regulating the course of physico-chemical events in brain activity. No metaphysical interaction in the classical sense is implied; the causal relation primarily involves the power of the whole over its parts. In a sense, mind moves matter in the brain just as an organism moves its component organs and cells, or a molecule governs the molecular course of its own electrons. In the case of conscious phenomena, it is the dynamic enveloping power of conscious high order cerebral processes over their constituent neural and chemical elements[12]. As an emergent interpretation of mind, it differs from the concepts of Gestalt psychology[13] in that the conscious effects are not ascribed to isomorphic field forces, nor are they considered to be mere correlates of neural activity. The conscious mind is put to work and given a reason for being and for having been evolved in a material world.

Although inseparably tied to the physical brain process, conscious awareness is conceived to be something distinct and special in itself, "different from and more than" the collected sum of its physico-chemical components. Values and other mental phenomena, though built of neural events, are no longer conceived to be reducible to, nor identifiable with, those events, nor to be mere parallel correlates.

This modified approach to the status of mind emerged largely out of efforts to account for the unity and/or duality and related aspects of conscious experience in split brain studies. I described the scheme initially[7] as a swing toward mentalism that puts conscious mind in the driver's seat in command over matter, gives ideas

and ideals control over physico-chemical interactions, and recognizes conscious mental forces as the crowning achievement of evolution. It provides a conceptual explanatory formula for the interaction of mind with matter that does not violate the principles of scientific explanation and is expressed in terms acceptable to modern neuroscience. Conscious mind is reinstated in the brain of objective science and scientific theory is squared with common sense on the mind-controlling-behavior issue.

A New Outlook

The involved change in the status of conscious mind in objective science carries with it a renunciation of much of the mechanistic, behavioristic, deterministic, and reductionistic thinking that formerly has characterized behavioral science and scientism. Long-standing epistemological paradoxes involving the separation of mind and matter, subjective and objective, fact and value, free will and determinism, and *is* and *ought* that have long puzzled and polarized ethical and scientific thinking, seem now to begin to resolve in principle. The current interpretation brings together selected aspects of prior materialist, mentalist, gestalt, monist and dualist doctrine. Some of its implications are explored here, not with any presumption that the present view offers definitive solutions, but only that it seems to represent an advancement containing certain features that differ from those on which value-belief systems have previously been built.

On the present terms it becomes increasingly impossible, among other things, to accept the idea of two separate realms of knowledge, existence, or truth: one for objective science and another for subjective experience and values. Old metaphysical dualisms and the seemingly irreconcilable paradoxes that have prevailed in psychology between the realities of inner experience on the one hand and those of experimental brain research on the other[14], disappear in a single continuous hierarchy. Within the brain, we pass conceptually in a hierarchical continuum from the brain's subnuclear particles on up through atoms, molecules, and brain cells to nerve circuit systems without consciouness, and finally to cerebral processes with consciousness. Objective facts and subjective values become parts of the same realm of discourse. The hiatus between science and values is erased in part by expanding the scope of science to encompass inner

experience, and also by altering the status of subjective values so that they are no longer set off in an epiphenomenal or other parallelistic subjective domain beyond the reach of science[8]. "Science" is used broadly here to include the knowledge, insight, perspectives, beliefs, and understanding that come from science as well as the relative validity, credibility, and reliability of the scientific method itself as an approach to truth so far as the human brain can know it. Also, one needs to remember in this connection that modern science includes the behavioral, political, social and related sciences and does not on the above terms imply the traditional hard-core materialism and strict objectivity of a decade ago[15].

So long as science was lacking a plausible account of mind in relation to matter, and excluded on principle the whole realm of inner subjective experience, the worldview of science remained incomplete and inadequate to provide answers in the realm of subjective moral value or higher meaning. Alternative world views built around more wishful metaphysical dimensions were not only more appealing to the public majority, but also remained competitive in credibility. With the value-rich world of inner experience no longer excluded on principle from the realm of science, scientism (i.e. the search for values and higher meaning through science) takes on added humanistic dimensions and a whole new look. On these revised terms the emotional, interpersonal, and aesthetic dimensions in ethical systems no longer exclude a scientific approach nor are they either excluded from an ethic based on science. Many of the antiscience and counterculture objections leveled against materialistic science no longer apply.

From the outset it has been recognized that this compromise operational interactionist approach to consciousness would provide in theory a long sought unifying view of mind, brain and man in nature and would go far to restore to the scientific image of man some of the freedom, dignity, and other humanistic attributes of which it has long been deprived.[7] An antireductionist worldview and interpretation of reality are also implied in which the qualitative pattern properties of all entities are conceived to be just as real and causally potent as are the properties of their elements or their quantitative measurements and abstractions. This preservation of the qualitative value and pluralistic richness of reality helps to counter antiscience views[5] that correlate science with reductionism.

The reductionist approach that would always explain the whole in terms of "nothing but" the parts leads to an infinite nihilistic regress in which eventually

everything is held to be explainable in terms of essentially nothing. By our present interpretation, it is better science to conceive wholes and their properties as real phenomena with their own meaning and causal efficacy. This means essentially that the pattern relationships of the component parts to each other in time and space are recognized to be of critical importance in causation and in determining the nature and meaning of all things and that these configurational relationships are not reducible to properties of the parts alone. The message will not be found in the chemistry of the ink. Thus, the search in science for a unifying explanatory formula for the unvierse is discouraged in favor of the recognition and sanction of pluralism.

Further Implications

A substantially altered picture of scientific determinism is also implied[7, 16]. Subjective values of all kinds, even aesthetic, spiritual and irrational come to be recognized as having causal control potency in the brain's decision-making process—along with all other components of the world of inner experience. Even such factors as one's subjective feelings about predicted outcomes anticipated to result from a given choice as long as 25 or 100 years in the future, may be entered proactively as causal determinants in the cerebral operations that lead to a given choice. In terms of the degrees and kinds of freedom of choice introduced thereby into the causal sequence of decision making, the human brain is clearly set apart above all other known systems, at an apex post in the deterministic universe of science.

Issues raised in the foregoing are central and fundamental to ethics and value questions at all levels. Value priorities especially in the ideological, religious, and cultural areas, are heavily dependent, directly or by implication, on concepts and beliefs regarding the properties of the conscious mind, and on the kinds of life goals and worldviews which these permit. Directly and indirectly, the latter depend on whether consciousness is believed to be mortal or immortal, or reincarnate or cosmic; and whether consciousness is conceived to be localized and brain-bound or essentially universal as in pan-psychism or Whiteheadian theory—or perhaps capable of "supracoalescence" in a megamind. Where formerly there were seemingly unlimited degrees of freedom for speculation in these areas, advances in

neuroscience during the last few decades substantially narrow now the latitudes for possible realistic answers. In modern neurology it is no longer a question of whether conscious experience is tied to the living brain, but rather to what particular parts of the brain, or to which neural systems and under what physiological conditions[17].

As the brain process comes to be understood objectively, all mental phenomena, including the generation of values, can be treated as causal agents in human decision making. The origins, directive potency, and the consequences of values all become subject, in principle, to objective scientific investigation and analysis. This applies at all levels, from that of the brain's pleasure-pain centers and other reinforcement systems on up through the forces that mold priorities at the societal, national, and international plane. Modern behavioral science already treats value variables and their formation as important causal variants in behavior, and it also deals analytically with goals, needs, motivation, and related factors at individual, group, and societal levels. Value variables are in principle reproducible through replication of similar brain states. What amounts to a separate science of values in the context of decision theory becomes conceivable, extending into all branches of behavioral science and forming a skeletal core for social science. Any advances in our understanding of the origins and logical structure of value systems can be expected to result in wiser selection and ordering of social values, and better value judgments and decisions generally.

Remaining Obstacles

Once it is possible, in principle, to resolve epistemological differences between mind and brain, subjective value and objective fact, determinism and free will, and to treat values objectively in the context of decision making, it then follows that other remaining obstacles and objections to an approach to values and meaning through science tend to disappear. The old argument of professional philosophy that it is logically impossible to determine what *ought to be* from what *is,* or to derive ethical values from scientific facts may hold on paper in the abstract. It carries little practical significance, however, when values are viewed pragmatically as above in a brain-behavior framework. Human values are inherently properties of brain activity and it invites logical confusion to try to treat them as if

they had independent existence artificially separated from the functioning brain. In the operations of the brain, incoming facts regularly interact with and shape values. In terms of cerebral processing, it is difficult to see a better way to determine "what ought to be" than on the basis of factual information, especially facts and deductions therefrom that have been scientifically verified. History and common observation confirm that nothing tells better than science what ought to prevail in order to achieve any defined aim, whether the aim be a landing site on Mars, improved health or whatever.

The human brain comes already equipped in advance with established value determinants and with inbuilt logical constraints that have their origins partly in biological heritage, partly in prior experience, and may even come through formal acceptance of ethical axioms. In practice, therefore, it is not a question of deriving values from the facts per se. Incoming factual information interacts as a cofunction with intrinsic cerebral value determinants in hen-egg fashion in the building of one's sense of value. The value system of any adult or society is determined in large part by objective facts. The mutual interactions through time between the inbuilt systems of values inherent in human nature and the developing worldview determinants form a complex manifold. Value judgments will never be made simple by a scientific approach and in some respects promise to become more complicated. One can hope only for improved value judgments through error correction and advanced insight. The worldview of science includes, of course, a growing understanding of the origins and structure of the inherent value functions and of their chronological shaping during development.

The question at issue may thus be framed more usefully in terms of the impact of a set of facts upon ongoing brain processes wherein values and related logical determinants already are operative. If one asks accordingly whether a set of facts can shape value priorities, the answer, of course, is "yes." We are constantly adjusting our values to conform logically with new factual information. The advance of science historically has always had a deep inevitable influence on social value systems. For present purposes, the innate primal system of values inbuilt in human nature (the personal and social aspects of which tend to form a large common denominator for any human value system) is treated largely as constant in order to focus on the more extrinsic variables that involve science and its alternatives. Our concern here is specifically with those value system variables introduced

by acceptance of the method and worldview of science. Many advances of past teachings in the area of personal and interpersonal relations would not be changed. The related problem of starting axioms or premises and prime determinants in ethical systems is considered separately below.

Science, as man's number one source of factual information, may be enlisted in the realm of value judgment on the simple and straightforward rationale that an informed judgment is generally preferable to one that is uninformed or misinformed. Merely to close the value gap that currently exists around the world between the informed and the uninformed might in itself go a long way to help counter current disaster trends. Similarly, if judgments about right and wrong are best arrived at on the basis of what is true, avoiding what is false, science would seem on this count as well to deserve a lead role in determining ethical values instead of being disqualified.

Some of the arbitrariness and endless complexity of human values that have always seemed forbidding to any approach through science disappear in part if one agrees to exclude the metaphysical and mythological, and to hold to a frame of reference supported by science. Societal values of the category that get written into law can be shown to be largely goal-dependent directly or by implication and arrangeable into logical hierarchical systems with major and subsidiary goals superseded by ultimate goals and conditioned throughout by inherent traits and needs of the species[3].

A quite different view would renounce any rational approach to ethics through science, not because social values should be left to the humanities, the church, the courts, or to Karl Marx, but rather on grounds that it is wiser that values be left to themselves to change spontaneously, by collective intuition as it were, in response to changing environmental conditions. Some economic realists assert that this is the only way that values change and eschew any moral philosophizing and idealizing as ineffectual. This latter overlooks the strong reciprocal interaction between mental concepts and environmental conditions and the tremendous impact that ideology and value systems have always had on the course of human history. It overlooks also the fact that social values formed merely on this situational feedback basis as a reflection of prevailing conditions tend in the democratic process to be locked to levels of tolerability.

Science and the Prime Determinants of Value

It is not only the value systems of formal religion that have been found wanting today, but also those based in humanist, communist, existentialist, and even in common humanitarian persuasions. Contemporary recourse to alternatives like the "lifeboat ethic" or that of "triage" hardly offer inspired solutions. The global ecospheric nature of current world problems calls for value perspectives built on something higher than just the human species or its societal dynamics, something that will include the welfare of the entire biosphere and ecosphere on a long term basis[4]. It becomes a logical necessity also in efforts to perceive any higher meaning or purpose, that humanity see itself in terms of a meaningful relation to something more important than itself.

The more critical value issues that must be faced in the near future will involve decisions that ultimately require appraisals of the relative worth of human life in various contexts. As terrestrial crowding conditions get tighter, for example, the value of human life must be balanced increasingly against that of other species. Having already destroyed the natural meaning and dignity of life for a number of subordinate species and permanently extinguished others, man will be forced to judge how much farther the violation of species' rights should be carried and by what ethic. Many more examples can be listed where scientific advancements, coupled with mounting population and related pressures, raise a growing host of moral dilemmas that resolve finally around the question of the ultimate worth and meaning of life itself. Possible answers become relative with alternatives that call for assessment within some larger ethic yet to be found. What is needed ideally, of course, to make decisions in these areas is a consensus on some supreme comprehension and interpretation of the universe and the place and role within it of man and the life experience.

The same position is reached by way of abstract value theory, in which values are shown to depend largely on goals, and that any concept or belief regarding the goal and value of life as a whole, once accepted, then logically supersedes and conditions values at all subsidiary levels. Value priorities become ordered and ethical issues judged in accordance with the conceived ultimate goal. This latter will imply in turn an associated "worldview" or universal scheme that is consistent.

By one route or another, then, we come down to these prime determinants of value priorities—these "life-goal", "worldview" concepts and beliefs, explicit or implied, that lie at the heart of the problem of values and pose the central challenge for a scientific or any other approach. This is where the great unknowns lie and also where the great differences of opinion are found. This is where answers are most needed and where any answers once accepted, right or wrong, have the greatest impact. And it is here also that the competence of science in the arena of values and any new ethic must eventually prove itself. The scientist, trained to rigorous reasoning and skepticism, to checking against empirical evidence, and above all, to avoiding false conclusions, may easily be persuaded at this point that value problems are not for science. It must, however, be remembered that final, absolute, or perfect answers are not demanded, only improved ones; and that society has in the past and probably will continue in the future to find and abide by some kind of answers from somewhere.

Actually, modern science, with its concepts of cosmology, evolution and the nature of conscious mind, reaching into all levels and aspects of the natural order from subnuclear particles on up through galaxies millions of light years away, has considerable to say about most of those fundamental cornerstone concepts upon which man's great mainline value systems have built through history. The worldview of modern science renders all previous schemes simplistic by comparison and provides man's most reliable understanding of, and rapport with those forces that move the universe and control creation. What has been accepted most commonly in the past as the highest reference for ethical standards and moral authority, man's creator, becomes in the eyes of science the vast interwoven fabric of all evolving nature. Each new scientific discovery and insight increases by that much more man's comprehension of the total design of evolving nature which, as indicated, implicates value and meaning in our current concept of mind and makes a final referent and framework for any ethical or moral system.

Some of the kinds of social value changes that might inhere in an ethic founded in science can be foreseen in broad outline[2, 3], but these remain for the most part still to be developed. Social decisions on ethical issues, however, do not require and frequently do not involve, nor wait on precise logical answers. Decision making proceeds commonly on the basis of vague impressions, inclinations, doctrinal perspectives, emotional leanings and convictions, personal biases, and

the like. Even a slight shift in the ethical norms of society, as along the science-antiscience axis, could set in motion, through a vast complex of decisional differences, changes affecting population policy, global conservation, and ecosystem planning generally, the overall future impact of which would make that of other top goals in science, like a cure for cancer, appear insignificant by comparison. Progress along the above lines could be greatly speeded on many fronts if we can merely clear the way by making it intellectually respectable and scientifically sound to think that "Science deals with values as well as with facts."

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